

THE LACCARIAS AND CLITOCYBES OF NORTH CAROLINA

By W. C. COKER and H. C. BEARDSLEE

PLATES 1 AND 7-33*

LACCARIA

Cap fleshy, thin, usually depressed or umbilicate in center; gills thick with blunt margin, broadly adnate, in our species usually notched at the stem (sinuate), colored conspicuously, whitened by the abundant spores which are subglobose, white or faintly lavender, and echinulate; stem central, fibrous and toughish. Volva and veil wanting. Gregarious or caespitose. Our four species of this genus are very closely related, so much so that certain authors (Ricken, *Die Blätterpilze* 2: 382. 1915) consider *L. laccata*, *L. amethystea* and *L. tortilis* all forms of the same species, and from our observations in several sections of the country it is impossible to define any one of these three species so as to exclude forms of the others. In the vicinity of Chapel Hill we find that *L. laccata* can be distinguished usually by its thinner, closer, less irregular gills which are nearly always paler than in the other two, where the variations are more confusing.

The genus differs from *Clitocybe* in the globose, asperulate spores and thicker gills which are more broadly attached, often sinuate and not decurrent except by a little tooth. The attachment of the gills is about as in *Tricholoma*, but that genus is separated by thinner gills and different spores. In *L. ochropurpurea*, *L. amethystea* and *L. tortilis* the mature gills are conspicuously white-dusted by the spores, but in the commonest forms of *L. laccata* this character is not well shown.

IMPORTANT AMERICAN LITERATURE

- Kauffmann. *Agaricaceae of Michigan*, p. 747 (as *Clitocybe*). 1918.
Morgan. *Journ. Cincinnati Soc. Nat. Hist.* 6: 66 (as *Clitocybe*). 1883.
Murrill. *N. Am. Flora* 10: 1. 1914.
Peck. *Bull. N. Y. St. Mus.* 157: 90. 1912.

* In the colored plate, figures 1, 6 and 7 were painted by Miss Dorothy Coker, figures 2 and 5, by Miss Cornelia S. Love and figures 3 and 8, by Miss Alma Holland. All spore drawings are by Miss Holland. Unless otherwise stated photographs are by Coker and are natural size. Those by Beardslee are noted "Photo by B." The written matter is by Coker unless otherwise stated.

PLATE 7



LACCARIA OCHROPURPUREA. No. 641.

KEY TO THE SPECIES

- Plants usually more than 5 cm. broad.....*L. ochropurpurea* (1)
- Plants less than 5 cm. broad
 - Cap not marked by lines; plants larger than *L. tortilis*
 - Gills pinkish lilac.....*L. laccata* (2)
 - Gills deep violet-purple.....*L. amethystea* (3)
 - Cap distinctly striatulate; plants small; growing in wet places.....*L. tortilis* (4)

1. *Laccaria ochropurpurea* (Berk.) Peck.

PLATES 7 AND 33

Cap 6-13 cm. wide, almost smooth or slightly scaly, often irregular and contorted, bright tan or clay color with a very light tint of pink from the flesh which is light pink, thick in the center and thin on the margin.

Gills purplish-lilac, changing to grayish purple and powdered by the spores, distant, very wide, thick, wavy and irregular, usually sinuate and slightly decurrent by a tooth.

Stem stout, usually crooked, variable in length and thickness, tough and firm, solid, color of cap, longitudinally marked with pinkish fibers.

Spores (of No. 1311) globose, minutely asperulate, 6.8-8.5 μ in diameter. A thick spore print of No. 4675 shows a decided tint of pale lavender like the gills.

Not rare in uplands along banks, roads and margins of woods.

For other illustrations see Peck, Bull. N. Y. St. Mus. 116: pl. 106. figs. 7-11. 1907; McIlvaine, Am. Fungi, pl. 24, figs. 1-4. 1900; Hard. Mushrooms, pl. 11.

- 100. In Battle's Park, October 8, 1904.
 - 179. In mixed woods near creek, Glen Burnie Farm, October 1, 1908.
 - 181. Under log in damp ground, October 1, 1909.
 - 641. From under the sides of rocks by a road, October 28, 1912.
 - 761. Along "Fern Bank," September 14, 1913.
 - 1311. By road through deciduous woods, October 7. 1914.
 - 4675. Mixed woods near Pittsboro road, October 15, 1920. Spores pale lavender, spherical with sharp straight muero, minutely echinulate, 7.2-9.5 μ thick.
- Asheville. Rather common. Beardslee.

2. *Laccaria laccata* (Scop.) Berk.

PLATES 1, 8 AND 33

Cap about 3 cm. broad on the average, running up to 6.5 cm., deeply depressed in center and often irregular and split, hygrophalous, surface light tan or reddish buff or buffy cinnamon when not soaked, a deeper reddish-ochraceous when soaked, rarely striatulate, squamulose-scurfy or only somewhat channelled and fibrous. Flesh very thin, tough and elastic, a light pink color, taste slightly woody, odor none.

Gills broad, up to 1.2 cm. wide, not crowded, sub-distant or distant, thickish and wavy, entire, or at times fragmented and irregular, notched at the stem, slightly decurrent by a tooth, pinkish with a tint of lilae.

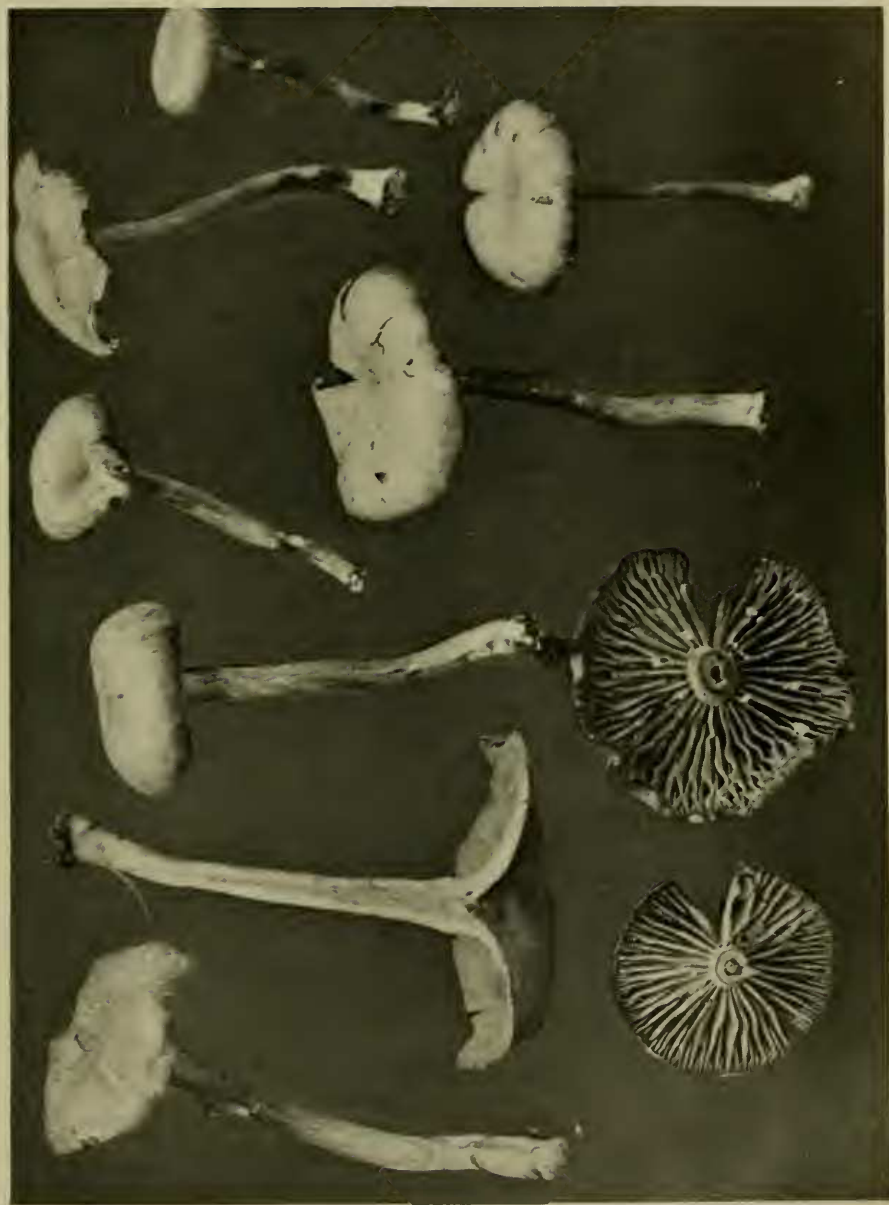
Stem 2.5-9 cm. long, 3-6.5 mm. thick, sub-equal or irregular, at times bulbous, hollow, tough, elastic, fibrous, color of cap with a tint of flesh.

Spores (of No. 854) spherical, echinulate, $6.6-7.6\mu$ in diameter not including the spicules. Basidia (of No. 5118) $7.4-8\mu$ thick, 4-spored; hymenium about 48μ thick, with a few crystals; threads of the gill flesh $3.7-7\mu$ thick, constricted at the septa, and parallel in section.

The species is common in pine and not rare in deciduous woods, growing often in populous colonies and sometimes in fairy rings. It is distinguished from *L. tortilis* by stouter form, thinner, closer and more regular gills, usually non-striate cap, and preference for upland woods. It differs from *L. amethystea* in absence of deep purplish color and thinner, closer and more regular gills.

For other illustrations see Cooke, Ills. Brit. Fungi, pl. 139; Hard, Mushrooms, figs. 76 and 77; McIlvaine, Am. Fungi, pl. 24, fig. 10. 1900; Murrill, Mycologia 3: pl. 40, fig. 4. 1911; Peek, Rept. N. Y. St. Mus. 48: pl. 25, figs. 1-13. 1895.

854. Growing abundantly in a large fairy ring about twenty feet in diameter under pines, September 18, 1913.
1413. Under pines near Piney Prospect, October 24, 1914.
1435. Under pines near Piney Prospect, October 28, 1914. Spores spherical, echinulate, $6.8-7.6\mu$.
1495. Under pines, Glen Burnie Farm, December 8, 1914.
2960. On ground in pine woods, December 3, 1917.
2993. On ground in pine woods, March 25, 1918.
3176. Low place in deciduous woods east of cemetery, October 3, 1918. Spores $6.3-8.5\mu$ thick.



3181. Among pines near branch southeast of campus, October 5, 1918. Spores white, spherical, papillate, $7-9\mu$.
 3246. By branch in deciduous woods, Lone Pine Hill, May 25, 1919. Spores $7-9.3\mu$ thick.
 5118. By branch south of campus, May 19, 1922. Typical. Spores spherical, minutely spinulose (less so than in *L. tortilis*), $6-8.2\mu$ thick.

Asheville. Very common. Beardslee.

Blowing Rock. Atkinson.

Reported by Curtis.

South Carolina: Hartsville. In pines and in a field, December 26, 1918 (No. 72. W. C. Coker, coll.).

3. *Laccaria amethystea* (Bull.) Murrill.

PLATES 1 AND 33

Cap 1-5 cm. broad, irregularly crumpled and lobed, in age the margin uplifted or reflexed; the center depressed or plane; surface like roughish leather, the margin finely scaly, not squamulose all over as typically in *L. laccata*, color when not soaked avellaneous to vinaceous buff (Ridgway); when young and when soaked almost as purple as the gills, the margin retaining the purple longer. Flesh very thin, up to 1 mm., toughish, concolorous, taste and odor musty-fungoid.

Gills distant, thick and leathery, up to .33 mm. thick, irregular, broadly adnate and decurrent by a tooth, color at all ages deep violet purple (about dull Indian purple of Ridgway), at maturity dusted with the spores.

Stem 3-5 cm. long, 2-5 mm. thick, sub-equal or enlarged below or above, crooked, tough, color of cap or whitish with a scurfy surface; in youth purple; stuffed then hollow.

Spores white, spherical, minutely spinulose, $7-10\mu$ thick. Basidia $5.5-8.5\mu$ thick, 2-4 sterigmata. Hymenium 48μ thick, with many crystals. Threads of the gill flesh $3.7-8\mu$.

In damp places in woods; rather rare. This plant has been considered a species or a variety or only a form of *C. laccata*. Peck treats it as a good species, Kauffman as a variety and Ricken as only a form. Careful comparison in the fresh state of this and the common form of *C. laccata* shows the latter to differ in broader, thinner, less distant and notched gills of a pinkish-lilac (much paler) color, cap more squamulose and buffy-cinnamon in color. For other illustrations of *L. amethystea* see Mycologia 10: pl. 8, fig. 2. 1918;

Bulliard, Herb. Fr., pl. 198; Bolton, Hist. Fung. Halifax, pl. 63. 1788.

3622. In pine woods by Bowlin's Creek, November 9, 1919.

5046. Among moss on side of stream, May 8, 1922.

5119. On earth by ditch in deciduous woods, May 19, 1922.

5178. By branch south of campus, June 6, 1922.

Asheville. Occasional. Beardslee.

4. *Laccaria tortilis* (Bolt.) B. & Br.

PLATES 1, 9 AND 33

Caps usually irregular, often eespitose, 0.5-2.3 cm. broad, rounded or nearly plane to depressed in center, usually slightly uniliccate, nearly smooth or minutely fibrous roughened, hygrophane, and, when water-soaked, of a dull fleshy-brick color with a distinctly deeper-colored line over each gill (striatulate); when dry pale fleshy buff and not striatulate or very faintly so. Flesh colored like the surface, brittle, very thin and translucent, only one-third mm. thick near stem; taste rather nutty.

Gills broadly adnate, usually sinuate, sometimes squarely attached, very slightly decurrent, distant, thick, irregular, the margin blunt, deep flesh color and distinctly powdered with the white spores.

Stem 1.2-3.5 cm. long, 1-2 mm. thick, equal, often twisted and bent, sometimes flattened; surface pruinose, flesh tough, fibrous, a small hollow, color of cap, the base often somewhat swollen and at times white with mycelium.

Spores white, spherical, echinulate, $7.4-10.3\mu$, (up to 11μ , counting the spines) usually about 9.2μ in diameter. Basidia (of No. 5121) $9.7-12.5 \times 30-37\mu$ with 4 long, curved sterigmata.

Frequent in damp depressions in woods and along wet ditches. The spores of our plant are smaller than the dimensions given by Peck, but they are distinctly echinulate and also very variable in size in the same plant. The striatulate cap, small size, irregular shape, thick distant and leathery gills, large spores and swampy habitat would indicate this species. Patouillard describes and figures the basidia as two-spored (see below). They have not been so in the plants we have examined.

For other illustrations see Mycologia 10: pl. 8, fig. 4 (as *L. striatula*). 1918; Bolton, Hist. Fung. Halifax, pl. 41, fig. A (as *Agaricus tortilis*). 1788; Patouillard, Tab. Fung., No. 105.



1951. In grass in moist place in Arboretum, November 1, 1915.
 2454. Swamp of New Hope Creek, September 28, 1916.
 2886. Swampy woods near Strowd's pasture, October 8, 1917. Spores spherical, echinulate, $7.4-10\mu$ thick, not counting spines, $8.4-11\mu$ counting spines.
 3199. Low place with moss, October 7, 1918. Spores $7.4-9\mu$ thick.
 3344. In moss by creek below Glen Burnie Farm, June 11, 1919. Spores $7-10\mu$ thick.
 3612. Damp ground near swamp, Strowd's low grounds, November 8, 1919. Cap 5-13 mm. broad, almost glabrous, striate when moist, deep reddish-ochraceous.
 5121. On earth by branch south of campus, May 19, 1922. A very small lot; gills sometimes decurrent, spores spherical, spinulose, $7.7-10.5\mu$ thick.
 Asheville. Rare, usually in damp places. Beardslee.

CLITOCYBE

Cap mostly depressed in center or infundibuliform, the margin involute to near maturity. Gills narrowed toward the stem, typically decurrent, but often only slightly so and rarely they are even a little notched at the stem. Stem fibrous externally, more or less elastic, not brittle, sometimes hollow, continuous with the flesh of the cap. Spores typically white, but flesh color in *C. cerussata* and tinted pinkish-lavender in *C. cyathiformis*, elliptic, pip-shaped or rarely subspherical, smooth in all species here included, said to be minutely echinulate in *C. pulcherrima*, *C. albissima* and *C. maxima*. Volva and annulus wanting. Growing on the ground or among leaves or on rotting wood. One species, not yet found here (*C. nebularis*), is the host of a parasitic *Volvaria* (*V. Loweiana*. See Mycologia 8: 65. 1916) and another (*C. peltigerina*) grows on the lichen *Peltigera*. This is not always an easy genus to determine as the gills are variable, in some cases approaching *Tricholoma*, in others *Collybia* or *Omphalia*. A few of the species are poisonous, as *C. illudens* and *C. morbifera*, but these are not classed among the deadly mushrooms. *Clitocybe sudorifica* causes profuse perspiration.

IMPORTANT AMERICAN LITERATURE

- Kauffmann. Agaricaceae of Michigan, p. 715. 1918.
 Morgan. Journ. Cincinnati Soc. Nat. Hist. 6: 66. 1883.
 Murrill. N. Am. Flora 9: 396. 1916; Mycologia 7: 256, pls. 164-166. 1915.
 Peck. Rept. N. Y. St. Mus. 23: 75. 1872. Bot. ed. Also Rept. 157: 59. 1912.

Stem base not swollen.....*C. media* (13)

1. *Clitocybe gigantea* Sowerby.*Parillus giganteus* (Sow.) Fr.

PLATE 10

Solitary or gregarious: cap up to 11 cm. wide, depressed in center, the margin incurved when young, drooping at maturity, usually very irregular and much lobed; surface whitish to light tan or buff, darkest in center, smooth or somewhat pruinose in angles. Flesh white, soft, mild.

Gills not crowded in our plants, irregular, thick, wide, up to 8 mm., many short ones, none forked, decurrent, but ending abruptly and bluntly and therefore somewhat resembling a *Tricholoma*. The gills are slow to develop and in young plants are very narrow.

Stem short, about 5 cm. long, 1.5-2 cm. thick, the outer part fibrous, the inner softer and often cavernous, usually bent at base; surface smooth, color of cap, pure white at the very top.

Spores white, smooth, elliptic, $3.5 \times 5-6\mu$.

A peculiar plant that is not closely related to other species of *Clitocybe*. It is said to reach a breadth of over a foot. The thick and irregular gills remind one of a *Parillus*, but they do not separate easily from the cap.

This agrees well with *C. gigantea* in the sense of Kauffman except that the gills are not very crowded. Ricken does not give the spores.

For other illustrations see Gillet, Champ. Fr., pl. 124 (100); Quélet, Champ. Jura et Vosg. 1: pl. 3, fig. 3. 1872; Cooke, Ills., pl. 106; Juillard-Hartmann, Icon. Champ. Sup., pl. 31, fig. 5.

1765. Low damp woods near pines at foot of Lone Pine Hill, September 12, 1915.

1832. In woods loam by branch south of Raleigh road, Rocky Ridge Farm, September 20, 1915.

Asheville. Rare. Beardslee.

Reported by Schweinitz.

2. *Clitocybe* sp. ?

PLATES 11 AND 33

Cap 4-13 cm. broad, broadly depressed in center, the margin plane or crimped and drooping, surface quite glabrous, sub-shining, viscid when wet; color buffy drab, between drab and wood-brown of

Ridgway. Flesh white, only up to 1 cm. thick at stem, very thin toward margin, pliable, taste mild and sweetish, odor faint.

Gills crowded, very narrow, hardly up to 2 mm. wide, fading to a line toward the stem and barely reaching it; color exactly that of the cap.

Stem 2-4.5 cm. long, 1.3-1.8 cm. thick, color and surface of cap, solid, soft and pliable, the base sub-bulbous.

Spores white, smooth, sub-elliptic to pip-shaped, $2.2-3 \times 4-5\mu$.

A peculiar plant, sharply marked by the uniform gray-buff color, soft, tough flesh and peculiar gills. In the absence of young stages and with only one collection we prefer not to name it as yet. It may possibly be a form of *C. nebularis*, but a plant of that species from Peck has gills broader and much darker in the dried state. It cannot be *C. geotropa*. In his *Funghi Mangerecci*, pl. 39, Bresadola shows an obviously different plant and the spores are nearly globose and rough. A plant from his herbarium, so labelled, has spores that are rough, but they are $3.7-4.6 \times 5-7\mu$ and are not like those of our plant. Ricken gives the spores at $5-6 \times 6-7\mu$ and does not mention roughness. *Clitocybe geotropa* is also recognized as being a paler plant than ours and as being umbonate or gibbous and it could hardly be brought to the thinness in center shown by No. 3210. (See Bresadola as cited above; Ricken, pl. 101, fig. 1; Bulliard, pl. 573; and Dumée, Atlas Champ., Ser. 2, pl. 15). *Clitocybe lenticulosa* Gill. is also easily different, with its rough cap and white, long decurrent gills (Champ. Fr., p. 144, pl. 130).

3210. In sandy humus near branch west of Meeting of the Waters, deciduous woods, October 9, 1918.

3. *Clitocybe tabescens* (Scop.) Bres.

Pleurotus caespitosus B. & C.

Clitocybe caespitosus (B. & C.) M. A. C. Not *C. caespitosa* Pk.

Clitocybe monadelphæ Morg.

Agaricus gymnopodius Bull.

PLATES 12 AND 33

Plants densely caespitose at bases of old stumps, and from underground wood. Cap up to about 7 cm. broad, usually between 4 and 6 cm., expanded and broadly umbonate; tawny or honey color, edge

PLATE 10



CLITOCYBE GIGANTEA. No. 1765.



PLATE 12



CLITOCYBE TABESCENS. No. 1342.
Reduced about one-fifth.

often water-soaked and darker, the surface with small scales in center, elsewhere nearly smooth or squamulose-fibrous.

Stem long, dark grayish-brown, tapering to a point at the crowded base, solid, tough, fibrous, bent and usually twisted.

Gills decurrent, not crowded, pale flesh color, often with brown stains.

Spores variable in size in the same plant, white, subspherical to elliptic, smooth, (of No. 1342) $4.8-7.4 \times 6.5-10\mu$.

This plant, which is very common around stumps from July to cold weather, is much like *Armillaria mellea* in habit, color, texture and general appearance, and is easily confused with it in passing. The entire absence of a veil in *Clitocybe tabescens* will, however, serve as an easy distinction between the two plants. Pure cultures of these two species grown on wood, agar and other media by one of our students, Mr. H. R. Totten, Instructor in Botany, shows that *C. tabescens* is certainly distinct from *A. mellea*. In agar, the rhizomorphs of the latter are blackish, while those of the former are white. (Jour. E. Mitchell Sci. Soc. 33: 96. 1917).

There seems no doubt that Bresadola is right in considering the American plant the same as the European. His good figure is just like our plants (Fung. Trident. 2: 84, pl. 197. Bulliard's plate, No. 601, is less good). Other synonyms given by Bresadola are *Agaricus socialis* DC., *Agaricus inarmillatus* Schulzer, *Lentinus caespitosus* Berk. Still other names, according to Murrill (N. Am. Flora 9: 420. 1916), are *Clitocybe aquatica* Banning and Peck and *Armillaria mellea exannulata* Pk. See a note by Lloyd in Myc. Notes 6: 54. 1901.

While not of first-class quality, this species is edible and on account of its great abundance could probably be made valuable to the housekeeper. It can be easily dried and put away for future use.

For other illustrations see Morgan, Journ. Cinn. Soc. Nat Hist. 6: pl. 4, 1883; McIlvaine, Am. Fungi, pl. 27 (as *C. monadelpha*), 1900: Hard, Mushrooms, pl. 12 (as *C. monadelpha*), 1908.

182. On underground wood, campus, September 27, 1908.

188, 198, 1342, 1373, 2453, 2457. All around stumps or from underground wood in October. Spores of No. 2457 elliptic, smooth, $5-6.5 \times 6-8.5\mu$, of No. 1373, $4-6 \times 5.5-8\mu$.

Asheville. Not common. Beardslee.

Reported by Curtis (as *C. caespitosus*).

4. *Clitocybe cerussata* Fr.*Clitopilus caespitosus* Pk.

PLATE 13

The following is by Beardslee:

Strongly cespitose; cap 3-10 cm. broad, round convex, becoming expanded and plane or depressed, white with a silky luster, often grayish white with a water-soaked appearance with age, margin thin, even or obscurely striate, inrolled at first. Flesh white to watery white.

Gills white becoming dingy or flesh-color, narrow, crowded, many shorter and a few forking, sinuate-adnate to adnate-decurrent.

Stem 7-10 cm. long, usually about 1 cm. thick, spongy stuffed becoming hollow, silky fibrillose.

Spores 2.5-3 x 4-5 μ ellipsoid, flesh color in mass.

This is without doubt Peck's *Clitopilus caespitosus*. In many ways, however, it is more suggestive of *Clitocybe* than *Clitopilus*. It is true that the spores have a rosy tint when they are viewed in mass, but they are much lighter than is usual in *Rhodospiraceae*. In fact if care is not taken to secure a good spore print they may easily pass for white. The fact that a number of species of *Tricholoma*, *Clitocybe*, and *Pleurotus* have spores that are not pure white lead to the belief that this plant might be known in Europe as a *Clitocybe*. Specimens and photographs were accordingly submitted to Bresadola who positively identified our plant as *C. cerussata* Fr., our usual form being variety *difformis*.

We are therefore referring our plant to this species especially as its large size, fragile flesh and light colored spores seem to indicate a closer relationship with *Clitocybe* than *Clitopilus*.

Asheville. In large masses in the margins of woods. Beardslee.

5. *Clitocybe illudens* Schw.

PLATES 14, 15 AND 33

Cap up to 15 cm. broad, expanded then depressed in center, bright orange or golden yellow; margin elevated or drooping, surface smooth and glabrous. Flesh yellowish, taste and odor rather strong.

Gills close, strongly decurrent, color of cap.

PLATE 13



CLITOCYBE CERUSSATA. Asheville, Photo by B.



CLITOCYTE ILLUDENS.
Near east gate of campus. Reduced.



